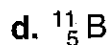
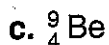
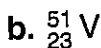
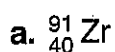


SELF-TEST

A. Multiple choice:

1. Fluorine has the nuclear symbol ${}^{19}_{9}\text{F}$. The total number of subatomic particles (neutrons + protons + electrons) in a fluorine atom is
 - a. 9
 - b. 10
 - c. 18
 - d. 19
 - e. 28
2. The combination of numbers and symbols in 5N_2 stands for
 - a. 5 nitrogen atoms
 - b. 10 separate nitrogen atoms
 - c. 5 nitrogen molecules
 - d. 10 nitrogen molecules
 - e. none of those
3. The number of protons in a molecule of CO_2 is
 - a. 3
 - b. 12
 - c. 16
 - d. 22
 - e. 32
4. The formulas of ammonium sulfide and aluminum fluoride are
 - a. NH_4SO_3 , Al_3F
 - b. NH_4SO_4 , AlF_3
 - c. $(\text{NH}_3)_2\text{SO}_3$, AlF_2
 - d. $(\text{NH}_4)_2\text{S}$, AlF_3
 - e. $(\text{NH}_4)_2\text{SO}_3$, AlF_3
5. The law of multiple proportions can be applied to
 - a. ${}^1_1\text{H}$ and ${}^2_1\text{H}$
 - b. Cl and Cl_2
 - c. CO_2 and SiO_2
 - d. CuO and Cu_2O
6. The formula of chromium(III) oxide is
 - a. CrO
 - b. Cr_3O
 - c. CrO_3
 - d. Cr_3O_2
 - e. Cr_2O_3
7. To form Fe^{3+}
 - a. an Fe atom must gain 3 protons.
 - b. an Fe^{2+} ion must gain 1 proton.
 - c. an Fe atom must gain 3 electrons.
 - d. an Fe^{2+} ion must gain 1 electron.
 - e. none of the above will work.
8. Consider the following statements
 - There are always more neutrons than protons in an atom's nucleus.
 - The nucleus of any atom is heavier than all its electrons.
 - In ions, the number of protons is always greater than the number of electrons.
 - An atom has always more subatomic particles than an ion.
 The number of true statements is
 - a. 0
 - b. 1
 - c. 2
 - d. 3
 - e. 4
9. In a chemical reaction, if an atomic particle carries a positive charge, then the atom has
 - a. lost electrons
 - b. lost protons
 - c. lost neutrons
 - d. gained electrons
 - e. gained protons

10. A nuclear symbol for the element simultaneously in group 5 and period 4 is



B. True or False:

- _____ 1. The electron has all the properties of the element.
- _____ 2. Neutrons have no charge and no mass.
- _____ 3. When an atom loses electrons, it becomes positively charged.
- _____ 4. Alpha (α) particles are identical to helium atoms.
- _____ 5. The simplest formula for $\text{C}_6\text{H}_{12}\text{O}_6$ is CH_2O .
- _____ 6. For the compound lithium chloride, the chloride ions are cations.
- _____ 7. Uncharged isotopes of the same element always have the same number of electrons.
- _____ 8. The proton is found in the nucleus of the atom.
- _____ 9. The mass number of an element represents the number of neutrons in the nucleus of that element.
- _____ 10. P-32 and S-32 have the same neutron to proton (n/p^+) ratio.

C. Fill in the blanks:

1. _____ ${}_{12}^{25}\text{Mg}^{2+}$ has (1) protons, (2) neutrons and (3) electrons.
2. _____
3. _____
4. _____ Period (4) has no metals.
5. _____ The symbol for the metalloid in Group 13 is (5).
6. _____ The name of the group to which sodium belongs is (6).

Atoms, Molecules, and Ions

7. _____ The name of the group to which neon belongs is (7).
8. _____ The name of the halogen with 35 protons in its nucleus is (8). (Write the name, not the symbol.)
9. _____ If a new alkaline earth were created, its atomic number would most probably be (9).
10. _____ The symbol for a metal that has 36 electrons and whose cation has a +2 charge is (10).
11. _____ (11) is the name of a post transition metal in Period 4. (Write the name, not the symbol.)
12. _____ (12) is the name of a molecule made up of two atoms of an element with 7 protons and three atoms of an element in Group 16, Period 2. (Write the name, not the formula.)

D. Problems: Consider the element zinc (Zn).

1. Look it up in the Periodic Table. What is its atomic number?
2. One of zinc's isotopes has a mass number of 64. Write the nuclear symbol for this isotope. Its ion is Zn^{2+} . How many electrons does its ion have?
3. Describe zinc as a metal, nonmetal, or metalloid; main group, transition or post-transition element. Describe its place in the periodic table (group and period).
4. Write the formula for the ionic compound formed when zinc ions (Zn^{2+}) combine with iodide ions (I^-).

5. Write the formulas of the following compounds:

carbon disulfide
aluminum carbonate
perchloric acid
ammonium permanganate
cobalt(II) sulfide
calcium hydride
ammonia
dinitrogen tetroxide
hydroiodic acid
magnesium hypobromite

6. Write the names of the following compounds:

$\text{Na}_2\text{Cr}_2\text{O}_7$
 P_4O_{10}
 $\text{Fe}_2(\text{SO}_4)_3$
 Na_2Se
 $\text{Ca}(\text{HCO}_3)_2$
 XeF_4
 ClI_3
 CH_4
 H_2SO_3
 $\text{Al}(\text{IO}_2)_3$

ANSWERS

Exercises:

(E1) 13 protons, 14 neutrons, 13 electrons

(E3) $\text{C}_2\text{H}_4\text{O}_2$

(E5) 16 protons, 18 electrons

(E7) Na_3N

(E10) ammonium carbonate

(E13) iron(III) sulfide

(E16) $(\text{NH}_4)_2\text{SO}_4$

(E19) phosphorus tribromide

(E8) $\text{Al}_2(\text{SO}_4)_3$

(E11) magnesium oxide

(E14) NaNO_2

(E17) $\text{Ca}(\text{ClO}_4)_2$

(E20) sulfur hexafluoride

(E2) CCl_4

(E4) 13 protons, 10 electrons

(E6) MnBr_2

(E9) lithium nitride

(E12) copper(II) sulfide

(E15) $\text{Rb}_2\text{Cr}_2\text{O}_7$

(E18) bromine iodide

SELF-TEST

A. Multiple choice:

1. e 2. c 3. d 4. d 5. d 6. e 7. e 8. b 9. a 10. b

B. True or False:

1. F 2. F 3. T 4. F 5. T 6. F 7. T 8. T 9. F 10. F

C. Fill in the blanks:

- | | | | |
|--------|----------------------|----------------|-------------------------|
| 1. 12 | 2. 13 | 3. 10 | 4. 1 |
| 5. B | 6. alkali metal | 7. noble gases | 8. bromine |
| 9. 120 | 10. Sr^{2+} | 11. gallium | 12. dinitrogen trioxide |

D. Problems

- 30
- ${}_{30}^{64}\text{Zn}$; 28
- Zinc is a transition metal in group 12, period 4.
- ZnI_2
- CS_2 , $\text{Al}_2(\text{CO}_3)_3$, HClO_4 , NH_4MnO_4 , CoS , CaH_2 , NH_3 , N_2O_4 , HI , $\text{Mg}(\text{BrO})_2$
- sodium dichromate, tetraphosphorus decaoxide, iron(III) sulfate, sodium selenide, calcium hydrogen carbonate, xenon tetrafluoride, chlorine triiodide, methane, sulfurous acid, aluminum iodite